Development of a Novel Functional Beverage using citrus peels

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ABSTRACT

Citrus fruits are an important fruit crop of global importance, both in terms of commercial value and nutritional importance. They are used by the juice industry in huge quantities. The objective of this study is to incorporate citrus peel powder at different concentrations as a natural colorant and an ingredient rich in bioactive compounds to formulate a functional beverage. For the beverage, the results were as follows: pH 5.635 ± 0.06; moisture content 85 ± 0.056%; DPPH antioxidant activity 92.59 ± 0.04%; ABTS 80.04 ± 0.19%; polyphenol content 150.28 ± 0.04 mg/100g; carotenoid content 13.76 ± 0.15 mg/100 ml; and tannin content 60.14 ± 0.06 mg/100 ml.

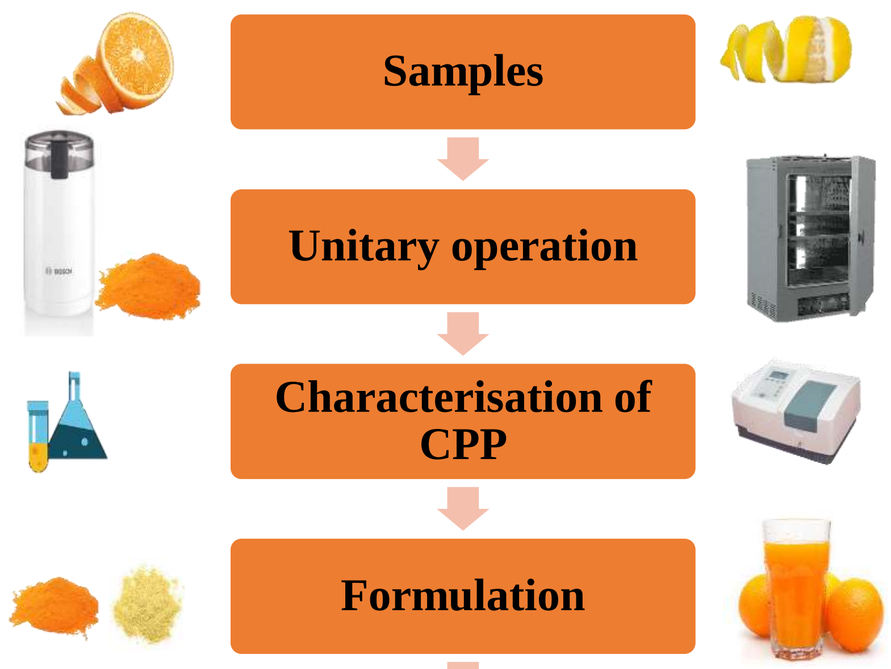
These results indicate the potential to incorporate citrus peels into food products, such as in the case of our functional beverage, to enrich food products with bioactive compounds and to valorize industrial by-products.

Keywords: valorization, citrus peels, functional beverage, antioxidant activity, phenolic compounds

INTRODUCTION

Citrus peels, which are by-products of the citrus industry, are increasingly recognized for their potential in the production of value-added products. They contain numerous beneficial compounds such as pectin, polyphenols, essential oils, and dietary fibers, which can be utilized in various sectors like food, pharmaceuticals, and cosmetics [1,2]. The incorporation of these compounds in the formulation of functional beverages can enhance their nutritional and health benefits, as these bioactive compounds can contribute to the production of high-value bioproducts [3]. Citrus peels also possess interesting medicinal properties, such as antioxidant, antimicrobial, and anti-inflammatory effects, which can be exploited for the development of functional food products [4].

METHODOLOGY



RESULTS AND DISSUCTION

Table 1: Physicochimical analyses of Bevrages

	pH	Acidité	Brix (%)	Fibres
Boisson T	**3, 33±0,007**	**7,216±0,017**	**12±0,03**	**0,225±0,013**
Boisson 1	**3,52±0,01**	**6,144±0,007**	**12,5±0,09**	**1,77±0,02**
Boisson 2	**3,62±0,016**	**5,76±0,01**	**14±0,005**	**3,53±0,014**

Table 2: Antioxidant activities of bevrages

	Bevrage 0	Bevrage 1	Bevrage 2
DPPH	**16,06±0,04**	**20,92±0,03**	**29,44±0,02**
ABTS	**35,52±0,02**	**58,46±0,01**	**67,13±0,01**

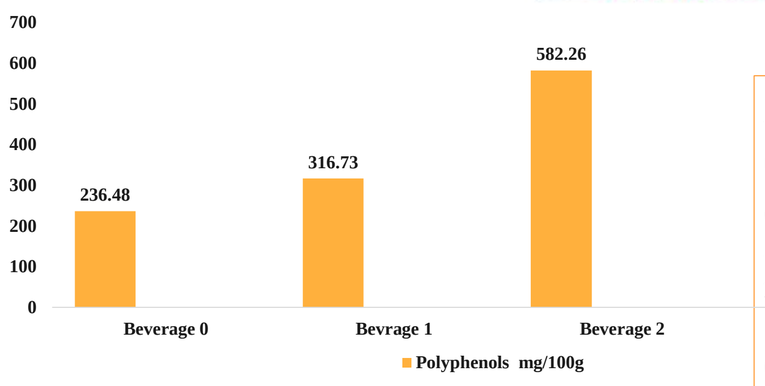


Figure a: Polyphenol content

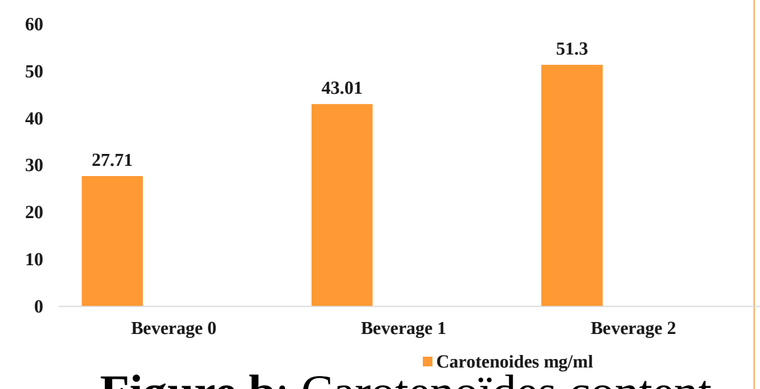


Figure b: Carotenoïdes content

ANOVA showed a significant effect ($p<0.01$) of the incorporation rate of orange peels on the content of carotenoids, polyphenols, and flavonoids in the beverage. The higher the incorporation rate of the peels, the more the levels of these bioactive compounds increase linearly in the drink. Correlation analyses revealed a strong positive correlation ($r>0.90$, $p<0.001$) between the content of phytochemical compounds and the antioxidant activity measured by different tests (DPPH, ABTS). This indicates that the increase in the incorporation rate of the peels leads to a significant improvement in the overall antioxidant capacity of the beverage.

CONCLUSION

The present work aims to valorize the peels of orange (Citrus sinensis) and lemon (Citrus limon) by incorporating them into a beverage, with the goal of formulating a functional drink rich in antioxidants and natural coloring, aligning with circular economy principles.

Citrus peel powders can be used as a functional ingredient to develop new and diverse beverages and food products.

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